U.S. EPA Superfund Program

Proposed Plan for the OU 2

Eagle Zinc Site
Hillsboro, Illinois

EPA ANNOUNCES PROPOSED PLAN **June 2012**

The United States Environmental Protection Agency (EPA) is issuing the Proposed Remedial Action Plan (Proposed Plan) to present EPA's preferred remedy for addressing operable unit (OU) 2 of the Eagle Zinc Superfund Site (Site). EPA is the lead agency for the Site, and the Illinois EPA (IEPA) is the support agency. This Proposed Plan summarizes information from the 2005 Remedial Investigation (RI), May 2012 Supplemental RI (SRI) and Feasibility Study (FS) reports. The RI/FS is part of the Administrative Record for the Site.

The Eagle Zinc Site is located in a mixed industrial/commercial/residential area in Hillsboro, Illinois. The Site is approximately 132 acres of land with 23 dilapidated buildings on over 30 acres of the property. In order to address the Site more effectively, EPA divided it into OUs. Operable Unit 1 addresses the risk from the contamination associated with the dilapidated buildings on the Site, while OU 2 addresses the risk associated with the contamination of the environmental media. A remedy was selected for OU 1 in September 2009; the OU 1 remedy consists of the demolition and onsite consolidation of the building debris. The focus of this proposed plan is to present remedial options to address the unacceptable risks associated with the contamination in OU 2 – the waste piles, residue, soil, sediment, and surface water.

Figure 1: Site Location

EPA is issuing this Proposed Plan to solicit public comments on the remedy; EPA is proposing to address OU 2 - the waste piles and the contaminated environmental media at the Site. The Proposed Plan is being issued as part of EPA's public participation requirements under Section 117 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C Section 9617, commonly known as Superfund, and Section 300.430 (f)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). After the close of the public comment period, EPA will announce its selection of the remedy for OU 2 in a document called the Record of Decision (ROD). The public's comments will be considered and incorporated into the ROD as part of the Responsiveness Summary. EPA encourages the public to review the documents that make up the Administrative Record to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted there.

The Administrative Record for the Site can be found at the following locations:

Hillsboro Public Library
214 School Street
Hillsboro, IL 60259
Phone: (217) 532-3055

EPA Region 5
Record Center, room 711
77 West Jackson Boulevard
Chicago, IL 60604

The alternatives that EPA evaluated for OU 2 include the following:

- Alternative 1 – No Action
- Alternative 2 – Immobilization of Leachable Residue Material & Consolidating Residue under a Soil Cover meeting Illinois Administrative Code (IAC) Section 807 Landfill Standards
- Alternative 3 – Immobilization, IAC Section 807-Compliant Soil Cover, & Stream Realignment
- Alternative 4 – Immobilization, IAC Section 811- Compliant Landfill Cap, & Stream Realignment

The preferred remedy discussed in the Proposed Plan will address unacceptable risks to human health and the environment from the contamination in the waste piles, residue, soil, sediment, and surface water at the Eagle Zinc Site. The goals of the preferred remedy are to: 1) Prevent exposure to future industrial and construction workers to contaminants of concern (COC) in the residue and soil, 2) minimize leaching of COCs into the groundwater, 3) reduce discharge of contamination into surface water and sediments and 4) prevent unacceptable risk to the aquatic receptors. Alternative 3 is the EPA's preferred remedy for the Site and includes the following components:

- ***Hazardous Waste Treatment*:** About 2,100 cubic yards of residue pile material, which exhibits the characteristic of leachability will be consolidated into one designated area and treated in-situ using immobilizing agents. The specific immobilization mix will be chosen during the remedial design and will be based on cost-effectiveness and the ability to prevent leaching.
- ***Onsite Consolidation and Containment*:** Consolidation and cover of residue, soil, and sediment exceeding the cleanup levels (CLs) set to protect against unacceptable exposure risks. The material will be consolidated and spread over approximately 22 acres of the Site and covered with an Illinois Administrative Code (IAC) 807-compliant cover. This area includes the southwestern pond, which would be filled in with the consolidated materials.
- ***Stream Re-alignment, Sediment Excavation, and Wetland:*** The westward flowing ephemeral stream will be realigned to reduce surface water contact with the existing residue and return the ephemeral stream to its natural flow pattern. The wetland area along the stream will be excavated to accommodate the re-alignment and a new wetland footprint would be constructed. Sediment from the former stream bed would be excavated, as needed, and consolidated with the residue underneath the cover. These areas will be stabilized with native seed and native riparian trees and shrubs. Contaminated sediment from the ditch and stream located along the southern perimeter of the Site, the two small onsite ponds, and the offsite tributary to the northeastern stream

system that drains toward Lake Hillsboro will be remediated by excavation and onsite disposal under the soil cover.

- ***Institutional Controls*:** A Uniform Environmental Covenant is already in place on the property to notify future property owners that the residue and soil at the Site pose potential risks to human health and the environment. The Covenant restricts the use of groundwater and prevents disturbance of the remedy. The Covenant also prohibits residential land use, which includes homes, hospitals and schools. The Covenant is binding on future owners and is enforceable by EPA and Illinois EPA.
- ***Monitoring and Assessment*:** There is some contamination in the onsite groundwater but the hydraulic conductivity on Site is too slow to produce sufficient quantity of water to be used for potable use. The groundwater is not considered potable and EPA does not expect drinking water wells would be used onsite in the future. Installation of drinking water wells is currently prohibited under the Covenant. The groundwater will not be actively remediated but the removal of the residue, contaminated sediment, and stream realignment is expected to effectively address the source of the contamination in the groundwater. The remedy is also expected to address the sources of contamination to surface water. EPA will continue to monitor the groundwater and surface water, providing annual reports that will document the analytical results, site inspections, trend analyses, and recommendations for the site-specific monitoring program. If groundwater conditions change, appropriate steps will be taken to address any acceptable risk or impairment to beneficial use.

The proposed remedy would be the final remedy for the Site. EPA has determined that the preferred remedy will effectively address the waste piles and contaminated environmental media at the Site.

EPA is issuing this Proposed Plan to solicit comments on the preferred remedy for the remediation of OU 2 at the Eagle Zinc Site. EPA will select the remedy for the Site after the public comment period has ended and comments received during the comment period have been reviewed and considered.

The Proposed Plan includes the following sections:

- **Site Background** – Presents facts about the Site which provide the context for the subsequent sections of the Proposed Plan;
- **Site Characteristics** – Describes the nature and extent of contamination at the Site;
- **Scope and Role** - Describes how the response action fits into the overall Site strategy;
- **Summary of Site Risks** – Summarizes the results of the risk assessments;
- **Remedial Action Objectives** – Describes what the proposed Site cleanup is expected to accomplish;
- **Summary of Alternatives** – Describes the options for attaining the identified remedial action objectives;
- **Evaluation of Alternatives** – Explains the rationale for selection of the Preferred Alternative;

- **Preferred Remedy** – Describes the preferred remedy and affirms that it is expected to fulfill statutory and regulatory requirements; and
- **Community Participation** – Provides information on how the public can provide input to the remedy.

I. SITE BACKGROUND

Site Location and Description

The Eagle Zinc Site is located in a mixed industrial/commercial/residential area in Hillsboro, IL, in Montgomery County. The Site is currently zoned commercial/industrial. It is bordered on the east by Industrial Park Drive and the Litchfield Bituminous Corporation, on the north by Smith Road, Hayes Abrasives, and the City of Hillsboro Water Treatment Plant, on the west by East Brailley Road and residential housing, and on the south by Fuller Brother Ready Mix Concrete facility, Vogel Lumber yard, and by the University of Illinois Extension office. The Site is approximately 132 acres and is covered with 23 buildings/structures over about 30 acres. The Site is divided into OUs: OU 1 consists of the contaminated buildings on the Site and OU 2, the focus of this proposed plan, is comprised of the waste piles, residue, soil, surface water, groundwater, and sediment. The Site contains several railroad spurs, residual material, two storm water retention ponds, one larger pond in the southwestern portion of the Site, one small pond in the southeastern portion of the Site, and several roads used for facility operations.

Site History

From 1912 to 2003, the Site was used for smelting and for manufacturing sulfuric acid, zinc oxide, and leaded zinc oxide. Residuals from the plant operations were placed in residue (waste) piles that have been categorized based on the processes that generated them. The Site originated as a zinc smelter facility under the name Lanyon Zinc Company in 1912. Lanyon Zinc Company produced various smelting products including zinc and sulfuric acid. The facility was then purchased by Eagle-Picher Industries in 1919. Eagle-Picher Industries operated and produced similar products until about 1935. During the early 1920s Eagle-Picher Industries began manufacturing zinc oxide and leaded zinc oxide. Manufacturing of leaded zinc oxide continued until around 1958 and production of zinc oxide continued until the facility closed. In around 1980 the facility was purchased by the Sherwin-Williams Company. In 1984, the facility was sold to Eagle Zinc Company, a division of T.L. Diamond and Company. Eagle Zinc continued the production of zinc oxide until 2003 when the facility ceased industrial operations.

During industrial operations large amounts of ore and smelter waste were stored onsite, according to historical documents. The leaded zinc oxide that was made at the Site was produced using the American process, which combined zinc ore concentrates with high levels of impurities. Waste materials generated from this process included slag, rotary kiln residue, muffle dross, metallic zinc particles, and refractory bricks. Significant portions of the Site are currently covered with smelter waste and other materials associated with historical smelting operations. An estimated 43,500 cubic yards of residue waste currently reside onsite in 15 piles. Residue is also spread across the Site. The residue thickness ranges

from a few inches thick to 28 feet thick based on soil borings; this is about 210,000 cubic yards of residue, not including the 43,500 cubic yards of residue consolidated into 15 piles around the Site.

II. SITE CHARACTERISTICS

Previous Environmental Investigations

In 1982, Sherwin-Williams conducted an environmental risk assessment using data collected in 1980. In 1984, a preliminary site assessment (PA) was conducted by IEPA and submitted to EPA. The report concluded that the soil samples from the early 1980s were not hazardous waste and therefore not subject to RCRA regulations.

In 1993, IEPA conducted an expanded site inspection (ESI) in order to provide significant documentation to support the Hazard Ranking System (HRS) record for the Site under CERCLA HRS. The ESI report was completed in 1996.

Remedial Investigation and Feasibility Study

The first phase of the Remedial Investigation (RI) was conducted between 2001 and 2005. The RI investigated the Site's physical characteristics, identified sources of contamination, explained the nature and extent of contamination, and evaluated the risk to human health and the environment. Field investigation activities included samples from the groundwater, surface water, sediment, residue, waste piles, and onsite and offsite surface and subsurface soil. The samples were analyzed for Volatile Organic Compounds (VOCs), Semi-VOCs, Polychlorinated Biphenyls, inorganic constituents, toxic characteristic leaching procedure (TCLP) and/ or synthetic precipitation leaching procedure (SPLP). Air modeling and soil deposition calculations were also created to determine if there were any airborne emissions from the residue piles.

The 2005 RI report and its addendum compared the chemical concentrations on the Site to conservative screening levels in order to identify potential chemicals of concern (COCs) for the residue piles, soil, sediment, surface water and groundwater. A human health risk assessment (HHRA) and a screening level environmental risk assessment (SLERA) were conducted as part of the 2005 RI. The primary PRPs were unable to complete the FS Report or address EPA's comments on the RI Report text because Eagle-Picher filed for bankruptcy and T.L. Diamond dissolved its business. EPA therefore proceeded to propose the Site for listing on the National Priorities List (NPL). The Site was listed on the NPL in September 2007.

In May 2008, IEPA conducted an independent sampling event at the Site to gather additional information on the levels of contamination in and around the buildings, and in the residue spread across the Site. The results of the X-Ray Fluorescence (XRF) sampling event indicated inorganic contamination exceeding the industrial screening criteria was located in, on, and around the dilapidated buildings. These high levels prompted EPA to conduct a response action for this Site immediately. A fence was erected around the site in January 2009 as part of a removal action to minimize exposure. Later, the Site was split into two OUs to address the Site more effectively. Operable Unit 1 addressed the contamination associated with the buildings. An interim ROD was signed September 16, 2009 and called

for the demolition of the buildings and consolidation of the debris in an onsite management cell. This remedy was designed in 2010 and will be implemented as soon as funding is available.

In October 2009, EPA and IEPA decided to conduct a supplemental RI/FS to address any data gaps in the 2005 RI. The supplemental RI (SRI) evaluated the COCs in groundwater screened beneath the residue, the leachability of the residue and waste piles, looked for the presence of COCs in soil beneath the residue. The SRI compared data from the 2005 RI to the data collected in 2010 and updated the HHRA and Ecological Assessment based on the new data collected. The data from 2010 was combined with the data from previous investigations and compiled in the SRI report, which was completed in May 2012.

The residue and waste piles are the primary source of contamination at the Site. Residue that exceeds the industrial regional screening level for soil (RSL) covers about 56 acres of the Site – approximately 255,000 cubic yards (cy) of residual materials. Total cadmium, copper, manganese, and zinc concentrations were found below their respective RSLs. Total arsenic and lead were found above their RSLs in a large portion of the residue samples; 52% of the samples exceeded the RSL for arsenic and 40% exceeded the RSL for lead. Redistribution of residue has allowed contaminants to be distributed to larger portions of the former manufacturing area and in between residue piles. This is the primary transport mechanism for residue to migrate to other media. Although the residue has not impacted the soil beneath it, water has infiltrated the residue, creating contaminated perched groundwater that flows into the drainage ways and water bodies on the Site. About 2,100 cubic yards of the residue material is considered hazardous waste because of its tendency to leach. This material is considered principal threat waste because it is highly mobile. This waste should be treated as part of any remedial action at this Site.

Groundwater is present in relatively impermeable clay, silty clay, and sandy clay below the residue to a depth of approximately 15 feet below ground surface (bgs). The geometric mean of the groundwater's hydraulic conductivity at the Site is $3x10^{-5}$, too slow to be used as a source of potable water. The IEPA agrees, based on the RI, that the groundwater should be classified as class II (non-potable). IEPA will finalize classification after additional rounds of sampling are taken during the design and action phases of the remedy. The depth to contamination is limited to the shallow water within the residue and some shallow groundwater within the silty clay soil beneath it. The deeper groundwater, about 55 feet bgs, does not show contamination above the federal MCLs. The high levels of cadmium and zinc in the onsite surface water is likely due to Site operations and the concentration of those contaminants in the perched groundwater. The sediment analytical results were compared to ecological screening levels (ESLs). Total arsenic, cadmium, copper, lead, manganese, and zinc were observed above the ESL in the sediment located onsite and offsite. No significant site-related contamination was found in the soil or groundwater offsite.

The feasibility study (FS) was completed in May 2012. The FS presents the remedial alternatives available for OU 2 and evaluates them based on their protectiveness, compliance with other environmental laws, permanence, cost-effectiveness, implementability and the use of treatment.

III. SCOPE AND ROLE OF THIS ACTION

The remedy presented in this Proposed Plan addresses OU 2 of the Eagle Zinc Site in Hillsboro, IL. EPA expects that remedial action will prevent exposure to future industrial and construction workers to COCs in the residue and soil, minimize leaching of COCs into the groundwater, minimize discharge of contaminated surface and groundwater into the Site water bodies, and prevent unacceptable risk to the aquatic receptors. The proposed remedy is expected to leave approximately 110 acres of the Site available for industrial and commercial reuse.

IV. SUMMARY OF SITE RISKS

Human Health Risk

Non-carcinogenic risks were assessed using the hazard index (HI) approach based on a comparison of expected contaminant intakes and comparing them to reference doses (RfDs) and reference concentrations (RfCs), which are estimates of the daily exposure levels of humans that are thought to be safe over a lifetime of exposure. The estimated intake of chemicals identified in the environmental media is compared to the RfD or RfC to derive the hazard quotient (HQ) for the contaminant in a particular medium. The HI is then obtained by adding the HQs for all compounds within a particular medium that impact a particular receptor population. The final HIs were calculated for each potential receptor by target organ or system. If the final HI exceeds 1.0, then there is potential for adverse effects on that target organ or system. The final COCs were determined based on HIs greater than 1.0, see the COC table below. Adolescent trespasser and offsite recreational user scenarios were run for this Site, but there are no unacceptable risks associated with this receptor at the Site. However, there is an unacceptable risk for industrial and commercial workers since they would be exposed to higher levels more frequently than a trespasser. If a future industrial worker were to incidentally ingest a little soil and residue every day over his or her lifetime (30 years), there is a potential that the person would have adverse effects due to the levels of antimony, zinc and lead in the residue/soil. For a future construction worker the total HI is 10 based on ingestion, dermal contact, and inhalation of antimony, cobalt, nickel, zinc, and lead. The proposed remedial action will address these unacceptable risks.

For carcinogens, risks are generally expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a carcinogen. For instance, an Excess Lifetime Cancer Risk (ELCR) of 1×10^{-4} means that the probability is 1 in 10,000 and the ELCR of 1×10^{-6} is 1 in 1,000,000. The acceptable risk range according to EPA's NCP is between 1×10^{-6} and 1×10^{-4}. There are no unacceptable risks due to carcinogens for the future industrial or construction workers.

Quantitative toxicity values are currently not available for lead. Therefore, the risk assessment for lead was done differently than the other non-carcinogens; it relies on blood lead levels or BLLs. In order to evaluate the risks associated with the industrial and construction workers due to lead exposure in the soil, EPA used adult lead methodology (ALM). The arithmetic mean concentration of lead in the Site soil was compared to the EPA default input parameters, the geometric standard deviation, and the baseline BLLs. Based on the average soil concentration for lead in the surface soil (4,508 mg/kg) and total soil (3,113

mg/kg), there is an unacceptable risk to the future industrial and construction workers. The ALM predicted that 72.6% of the industrial worker population and 97.4% of the construction work population would have BLLs above 10 micrograms per deciliter. The target probability of a receptor population having BLL of 10 micrograms per deciliter is 5%. The proposed remedial action will address these unacceptable risks.

Ecological Risk

A screening level ecological risk assessment (SLERA) and SLERA addendum were conducted for the Site in 2005 in conjunction with the RI report to evaluate whether valuable wildlife resources may be adversely impacted by exposure to site-related contaminants. The SLERA evaluated potential risks to aquatic, terrestrial, and avian receptors. The receptors could be in contact with contamination via ingestion, respiration, contact, and via the food web. The food web model used the deer mouse, the American robin, and the red-tailed hawk. The piscivorous wildlife was evaluated based on surface water and dietary prey exposures. The SLERA was conducted in a conservative manner for each medium and wildlife combination assuming maximum exposure. The risk, represented by the hazard quotient (HQ), was calculated by dividing the exposure estimates by conservative ecotoxicity screening values. The results of the SLERA indicated that elevated HQs for the receptors of concern in the near field Western and Eastern Drainage Areas are related to locally elevated levels of zinc and cadmium in surface water and sediment.

Although the SLERA concluded there are no significant impacts to the terrestrial ecological community, there is a significant risk to the aquatic organisms due to high levels of cadmium and zinc in the sediment and surface water. The screening level for cadmium in sediment is 0.99 parts per million (ppm) and 121 ppm for zinc. A ppm is equivalent to one inch in 16 miles or one cent in $10,000. The zinc concentrations in the sediment range from 310 ppm to 245,000 ppm, significantly above the screening criteria and the probable effect concentration (PEC) for zinc, which is 459 ppm. The PEC for each contaminant is the concentration at which adverse effects to sediment organisms are expected to occur frequently. The cadmium concentrations in the sediment range from 0.91 ppm to 550 ppm. These levels are also significantly above the screening levels as well as the PEC (4.98 ppm). There are zinc and cadmium concentration in the surface water that exceed the Illinois Administrative Code (IAC) General Use Water Quality Standards – 0.0254 ppm and 0.001 ppm, respectively. The surface water concentrations of zinc range from 0.155 to 25 ppm.

High metal concentrations in the residue, soil, sediment, and surface water present unacceptable risks to future commercial/industrial workers, construction workers and the environment. Also, these metal concentrations have the potential to cause adverse effects on the aquatic receptors onsite and offsite. Therefore, based on the results of the human health and ecological risk assessments, the response action selected in the ROD is necessary to protect public health or welfare of the environment from actual or threatened releases into the environment.

Table 1. Contaminants of Concern and Cleanup Levels

Media	Contaminant of Concern	Cleanup Level
Residue/Soil	Lead, Zinc, Cobalt, Nickel, and Antimony	**Industrial Regional Screening Level (RSL):** Lead (800 ppm), Zinc (310,000 ppm), Cobalt (300 ppm), Nickel (41,000 ppm), Antimony (410 ppm)
Surface Water	Cadmium and Zinc	**IEPA General Use Surface Water Standards:** Cadmium (0.001 ppm) Zinc (0.025 ppm)
Sediment	Cadmium and Zinc	**Ecological Screening Levels:** Cadmium (1 ppm) Zinc (121 ppm)

V. REMEDIAL ACTION OBJECTIVES

To protect the public and the environment from current and future health risks, the following Remedial Action Objectives (RAOs) have been developed to address the contamination at OU 2:

Residue and Soil

- Prevent exposure to industrial and construction workers from COC concentrations in residue and soil that exceeds the industrial regional screening level.
- Prevent residue erosion of COCs into the surrounding water bodies so that Cleanup Levels are not exceeded in those water bodies or the sediment.
- Minimize leaching of COCs into the groundwater that discharges into surrounding water bodies in order to prevent unacceptable risk to aquatic receptors.

Surface Water and Sediment

- Prevent unacceptable risk to the aquatic receptors from COCs that exceed the Cleanup Level in surface water and/or sediment within a reasonable timeframe.

VI. SUMMARY OF REMEDIAL ALTERNATIVES

The remedial alternatives for the Site are presented below. The alternatives are numbered to correspond with the alternatives in the FS.

Alternative 1 – No Action

Alternative 1 provides a baseline evaluation of the proposed remedial alternatives, as required by the NCP. Under this alternative, no remedial actions would be conducted at the Site. Direct contact with residue and soil would pose a risk to industrial and construction workers, if residue remained onsite or was redistributed across the Site in the future. Surface

water would continue to exceed Cleanup Levels as a result of contaminants leaching to water perched in residue and impacted groundwater perched in residue discharging to water drainage systems. Sediment would remain a potential risk to ecological receptors. This remedy would only include the costs of conducting a site review every five years for 30 years, which is about $100,000.

Alternative 2 – Immobilization and an IAC 807 Compliant Soil Cover

Immobilization of Residue Piles NP-14, RR1-3, and MP1-21: Residue piles, which exhibit the characteristic of leachability (NP-14, RR1-3, and MP1-21) would be consolidated into one designated area and treated in-situ using immobilizing agents to meet the SPLP-, as well as TCLP-, based Cleanup Levels for cadmium, lead, and zinc. The treated residue piles would be consolidated with the other residue material and covered as described below. Immobilization is possible with agents such as phosphate, sulfide, or cement-based agents. The exact immobilizing agent will be determined in the design phase. The immobilization mix will be chosen based on cost effectiveness and its ability to prevent leaching. The estimated volume to be treated is 2,100 cubic yards.

Consolidation, Grading, and Cover of Residue Material Exceeding the CL: Loose residue and waste piles that exceed the Cleanup Levels would be consolidated in the southern portion of the Site where contaminated residue is already present. The consolidated materials would be graded, and covered with clay and topsoil. The future temporary demolition management cell containing OU 1 demolition debris would be dismantled and incorporated into the residue area to be covered. The immobilized residue piles will also be covered. The area of residue to be covered is approximately 18 acres. The volume of residue outside the cover area to be consolidated is estimated to be 191,000 cubic yards. The volume of surface soil outside the cover area to be consolidated and covered is estimated to be 62,220 cubic yards. The specific dimension of the consolidation cover area will be developed during the design phase and will be configured to be consistent with future development of the rest of the Site.

The area chosen for consolidation placement of residue would first be cleared, grubbed, and regraded to establish the required design slopes. The consolidated area would be near the southwestern pond, but the pond will not be filled in. The final slopes of the soil cover would be designed to promote water runoff while minimizing the potential for erosion. The residue would be covered with an IAC 807-compliant soil cover consisting of a compact layer of no less than 24 inches of suitable material. A six-inch vegetative soil cover would be added to prevent direct contact with the residue and the controlled surface water drainage system. The surface water drainage system is expected to keep flow away from the consolidated area which would minimize infiltration and subsequent contamination of the perched water, surface water, and sediment. By reducing the flow of water through the residue, the cover should result in a rapid reduction of COC concentrations in the perched water and the surface water.

In addition, because the soil cover over the residue will prevent erosion of contaminated residue into the two small onsite ponds, and will allow deposition of uncontaminated sediment over the existing sediment, exposure to contamination in those ponds will be reduced, and contamination levels will naturally attenuate. In addition, sediment from two

small onsite ponds would be remediated by monitored natural recovery. Sediment levels would be monitored to verify these results.

Institutional Controls: A restrictive covenant was placed on the Site in November, 2011. The covenant provides notice to future property owners that the residue and soil at the Site poses risks to human health and the environment. The covenant restricts use of groundwater and prevents disturbance of the remedy. The Covenant also prohibits residential land use, which includes homes, hospitals and schools. These land-use restrictions are maintained through future property transfers and acquisitions.

Monitoring and Assessment: Groundwater, surface water and sediment would be monitored using eight different monitoring wells and five sediment/surface water locations. For two years after the implementation of the remedy the Site would be sampled quarterly. The results will be evaluated and compared against the Cleanup Levels. The monitoring would be reduced to semi-annual events depending on the analytical results. A report would be prepared annually to document the analytical results, site inspections, trend analyses, and recommendations for the site-specific monitoring program.

This remedy would take 3 months to complete and would cost $15,300,000

Alternative 3 – Immobilization, IAC 807 Compliant Soil Cover, and Stream Re-alignment

Immobilization of Residue Piles NP-14, RR1-3, and MP1-21: Alternative 3 immobilization of residue piles would be the same as Alternative 2.

Consolidation, Grading, and 807 Cap over Residue Piles: Alternative 3 consolidation and cover of residue and soil exceeding the Cleanup Levels would be the similar to Alternative 2; however, the area to be covered would be larger, approximately 22 acres, and the southwestern pond would be filled in with the residue material. The volume of residue outside the cover area to be consolidated is estimated to be 168,000 cubic yards. The volume of surface soil outside the cover area to be consolidated and covered is estimated to be 58,000 cubic yards.

Stream Re-alignment, Sediment Excavation, and Onsite Consolidation: The westward flowing ephemeral stream that originates in the center of the Site and flows into the southwestern corner of the Site would be realigned and in doing so, contaminated sediments would be removed. The ephemeral stream would no longer be in contact with contaminated residue or sediments, and would to its natural flow pattern. The new stream length is assumed to be 3,200 linear feet with dimensions of 8 feet wide and 1 foot deep. The wetland along the stream would be excavated to accommodate the re-alignment. A new wetland footprint would be constructed to retain some of the wetland functions, the ecological habitat, and to increase the area's storage capacity during large storm events. Sediment from the former stream bed would be excavated, as needed, and consolidated with the residue underneath the cover. The existing surface water pond, stream, and wetland would be filled with soil excavated from the construction of the new stream channel and wetland. These areas will be stabilized with native seed and native riparian trees and shrubs.

Sediment from the ditch and stream located along the southern perimeter of the Site, the two small onsite ponds, and the offsite tributary to the northeastern stream system that drains

toward Lake Hillsboro would be remediated by excavation and onsite disposal under the soil cover. The banks of this 830-linear-foot offsite reach would be restored using typical bioengineering bank stabilization techniques.

Institutional Controls: Alternative 3 institutional controls would be the same as those presented in Alternative 2.

Monitoring and Assessment: Alternative 3 monitoring and assessment would be similar to Alternative 2, except that the sediment would not be monitored since it would be actively remediated under Alternative 3.

This remedy would take 5 months to complete and would cost $18,700,000

Alternative 4 – Immobilization, IAC 811 Cap, and Stream Re-alignment

Onsite Immobilization of Residue Piles NP-14, RR1-3, and MP1-21: Alternative 4 immobilization of residue piles would be the same as Alternative 2.

Consolidation, Grading, and 811 Cap over Residue Piles: The Alternative 4 consolidation and cover is similar to that of Alternatives 2 and 3, except Alternative 4 has an IAC 811 cap instead of an IAC 807 soil cover. The specific cap cross section would be selected in the design, but for cost estimating purposes it is assumed that the cross section would include: six inches of topsoil (with vegetation), 3 feet of soil for freeze-thaw protection, double-sided geocomposite, 40-mil linear low density polyethylene geomembrane, and two feet of low-permeability clay or a geosynthetic clay liner.

Stream Re-alignment, Sediment Excavation, and Onsite Consolidation: Alternative 4 stream re-alignment, sediment excavation, and onsite consolidation would be the same as that for Alternative 3.

Institutional Controls: Alternative 4 institutional controls would be the same as those presented in Alternative 2.

Monitoring and Assessment: Alternative 4 monitoring and assessment would be the same as Alternative 3.

This remedy would take 5 months to complete and would cost $24,600,000

Common Elements and Distinguishing Features: All of the alternatives are protective of human health and the environment, except Alternative 1, the No Action Alternative. Alternatives 2-4 use treatment to address the characteristically hazardous waste and address 255,000 cubic yards of the residue material. The protective alternatives will return 110 acres of land to industrial/commercial use since the residue will be excavated and consolidated in the southern portion of the property. The protective alternatives will meet RAOs eventually but Alternatives 3 and 4 will meet the RAOs much quicker because contaminated sediment is being removed and the stream realigned around the contaminated area. Alternative 2 leaves the southwestern pond in place, while Alternatives 3 and 4 include dewatering of the pond and using it as part of the onsite storage of the residual material.

VII. EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to identify a preferred remedy. The nine criteria are discussed in Table 2, below. More description of the alternatives relative to the nine criteria and a more robust comparative analysis of the alternatives can be found in the *Detailed Analysis of Alternatives* section of the FS.

Table 2: EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

Threshold Criteria	**1. Overall Protection of Human Health and the Environment** determines whether an alternative eliminates, reduces, or controls threats to human health and the environment through institutional controls, engineering controls, or treatment.
	2. Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site; or whether a waiver is justified.
Balancing Criteria	**3. Long-term Effectiveness and Permanence** considers the ability of an alternative to maintain protection of human health and the environment over time.
	4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
	5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
	6. Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
	7. Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total of an alternative over time in today's dollar value. Cost estimates are expected to be accurate within a range of +50% to -30%.
Modifying Criteria	**8. State Acceptance** considers whether the State agrees with EPA's analyses and recommendations, as described in the RI/FS and the Proposed Plan.
	9. Community Acceptance considers whether the local community agrees with EPA's analyses and preferred remedy. Comments received on the Proposed Plan are an important indicator of community acceptance.

DETAILED ANALYSIS OF THE PROPOSED REMEDIAL ALTERNATIVES

1. Overall Protection of Human Health and the Environment

Alternative 1 is not protective of human health and the environment compared to other alternatives; therefore, it will not be evaluated further. Alternatives 2, 3, and 4 are all protective of human health and the environment for both current and reasonably foreseeable future use.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Alternatives 2, 3, and 4 comply with ARARs. There are many ARARs for the proposed alternatives. The proposed plan only highlights the key laws that must be complied with during the remedial action. A more detailed listing of the ARARs will be provided in the ROD. The main action-specific ARARs are the RCRA regulations for management, treatment and disposal of hazardous waste and the Illinois Solid Waste Regulations in IAC Title 35 Subtitle G. This would apply to the in-situ treatment of the hazardous residue and cover components of the proposed remedy. While the IAC 811 landfill cover requirements are also relevant, the IAC 807 landfill cover requirements appear to be more appropriate. The IAC 807 cover is designed to minimize leachate and infiltration, and the additional prevention of infiltration provided by the IAC 811 cover in Alternative 4 does not appear to be necessary when the most leachable material under the cover is immobilized through treatment and the potential impact on groundwater and surface water is already limited.

The location specific To Be Considered regulations or TBCs for the Eagle Zinc Site are as follows: the Fish and Wildlife Coordination Act protects fish and wildlife when actions modify the control or structure of a natural stream or body of water; and the Illinois Department of Natural Resources regulates certain construction activities in the floodways of streams in the urban areas where the stream drainage is 1 square mile or more. The location specific ARAR is Section 404 of the Clean Water Act establishes standards for activities that would destroy or degrade wetlands, and protocols for mitigation of the lost wetland habitat required for the stream re-alignment component of Alternatives 3 and 4.

3. **Long-Term Effectiveness and Permanence**

Alternatives 2 through 4 have varying levels of long-term effectiveness and permanence. Alternative 2 is the least effective and permanent because sediment contamination would remain in place. Alternative 3 is more permanent and effective than Alternative 2 because it removes sediment contamination. Alternative 4 adds further permanence because the impermeable cap required under IAC 811 will eliminate all infiltration. Alternatives 2, 3 and 4 all require monitoring and maintenance of the cover to assure long-term effectiveness.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 2, 3, and 4 include treatment to reduce the leaching of metals in approximately 2,100 cubic yards of residue. Each alternative would use similar immobilization agents to reduce the mobility of lead in the residue, preventing contaminants from leaching and migrating offsite.

5. Short-Term Effectiveness

Alternatives 3 and 4 are more likely to impact construction workers because these alternatives require more excavation. These alternatives also have some adverse impacts to the ecological habitat in the short-term because they require re-alignment of the stream and wetland area. The stream will be re-aligned in an uncontaminated area and a new wetland area will be created. Alternative 2 will take three months to construct so the short-term

adverse impacts will be limited to implementation time. Alternatives 3 and 4 would take the longest, five months, but the short-term impacts are manageable.

6. Implementability

Alternatives 3 and 4 would be more difficult to implement than Alternative 2. The main technical challenge is the steep topography that would be encountered with the stream re-alignment.

7. Cost

Out of the three protective alternatives, the lowest cost alternative is Alternative 2 with a present worth of $15,300,000. Alternative 3 is the next least costly alternative with a present worth of $18,700,000. Alternative 4 is the significantly more costly than the other two alternatives with a present worth of $24,600,000. See Table 3, below for a comparison of the costs.

Table 3. Cost Comparison of Alternatives

Alternative	Cost
Alternative 1 – No Action	**$100,000**
Alternative 2 – Immobilization and 807 cover	**$15,300,000**
Alternative 3 – Immobilization, 807 cover, and stream realignment	**$18,700,000**
Alternative 4 – Immobilization, 811 cap, and stream realignment	**$24,600,000**

8. State Acceptance

The State of Illinois has expressed support for EPA's preferred alternative. State acceptance of the preferred remedy will be fully evaluated after the public comment period ends.

9. Community Acceptance

Community acceptance of the preferred remedy will be evaluated after the public comment period ends. EPA's response to public comments received will be available in the Responsiveness Summary section of the ROD.

VIII. EPA'S PREFERRED ALTERNATIVE

EPA's preferred remedy is Alternative 3, which consists of: (1) Treatment of characteristically hazardous waste; (2) consolidation of treated waste and solid waste (residue) under a 22 acre IAC 807 compliant cover; (3) sediment excavation and stream realignment, (4) wetland removal and replacement; (5) institutional controls to preserve the remedy's integrity and prevent exposure; and (6) monitoring and assessment of groundwater and surface water.

All of the proposed alternatives, except the "No Action" Alternative are protective and meet ARARs; they also employ treatment to reduce toxicity, mobility or volume of hazardous substances. All of the alternatives are readily implementable although Alternatives 3 and 4 are more difficult to implement than Alternative 2. All the alternatives have manageable short-term

impacts. Alternative 4 is significantly more expensive than the rest of the alternatives. Although Alternative 4 is the most protective alternative, the additional protectiveness provided by Alternative 4 is not necessary or cost-effective because the leachable materials under the cover will have already been treated so that additional protection from infiltration is not needed. Alternative 2 is the least protective because it does not remove contaminated sediment. Therefore, Alternative 3 is the preferred alternative because it provides sufficient protection and mitigates the potential contaminant transport offsite in the most cost-effective manner. A conceptual map of the preferred alternative is provided below.

Based on the information currently available, the lead agency believes the Preferred Alternative meets the threshold criteria and provides the best available balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The U.S. EPA expects the Preferred Alternative to satisfy the following statutory requirements of CERCLA Section 121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery to the maximum extent practicable: 5) satisfy the preference for treatment as a principal element.

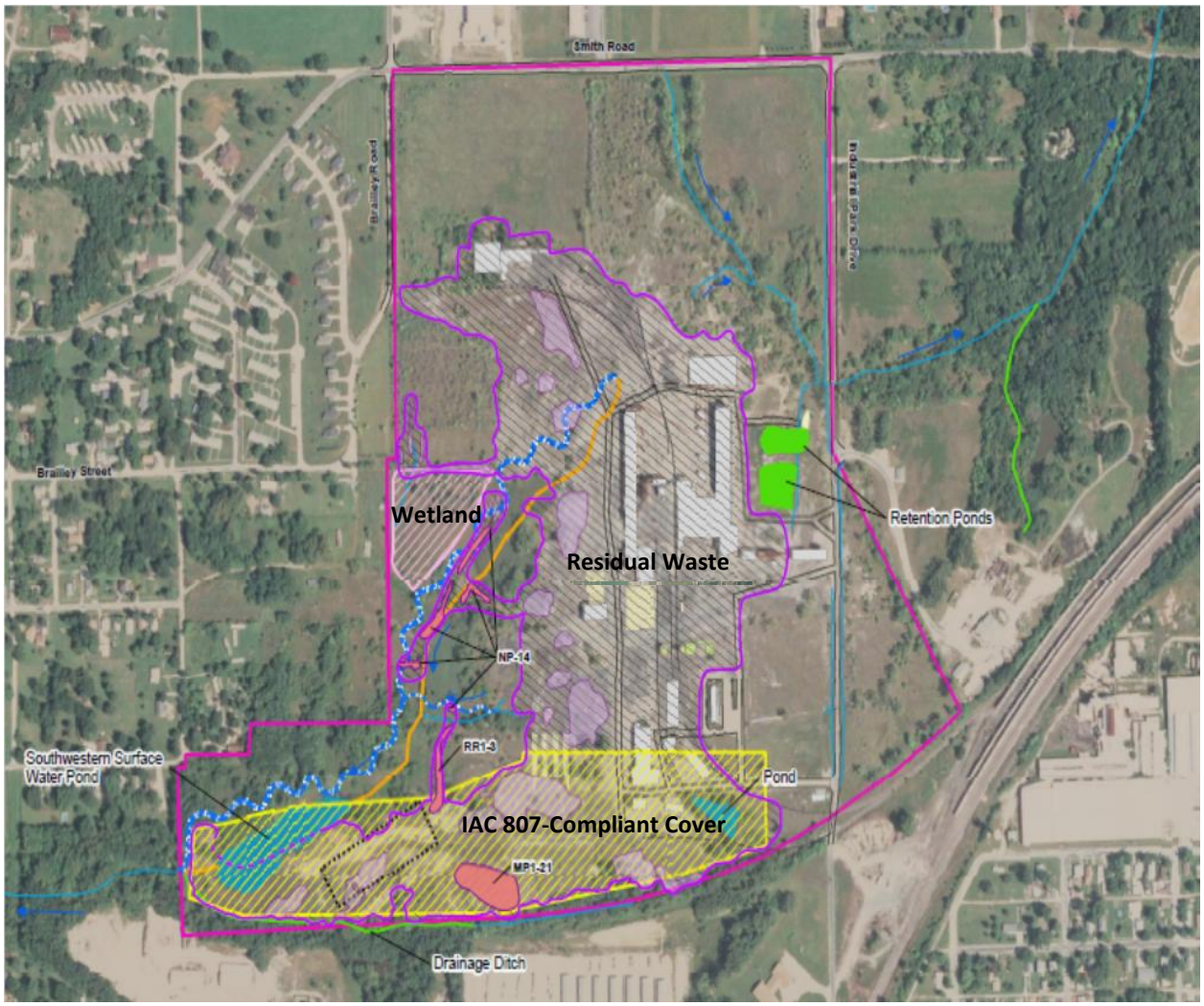

Figure 1: Concept Map of EPA's Preferred Remedy

IX. COMMUNITY PARTICIPATION

EPA relies on public input so that the remedy selected for each Superfund site meets the needs and concerns of the local community.

The public comment period ensures that the community's concerns are being addressed; a public comments period will open on May 30, 2012 and close June 30, 2012. During this time the public is encouraged to submit comments on the Proposed Plan to EPA.

A public meeting will be held to discuss the Proposed Plan on June 14, 2012 from 6:30 p.m. To 7:30 p.m. The public meeting will be held in the cafeteria of Hillsboro High School, 522 East Tremont Street, Hillsboro, IL 62049.

It is important to note that although EPA has proposed a preferred remedy, the remedy has not yet been selected for the Site. All relevant comments received will be considered and addressed by EPA before the remedy is selected. The cleanup plan could differ from information in this

proposed plan, depending on information or comments EPA receives during the public comment period.

Detailed information on the material discussed in this document may be found in the Administrative Record for the Site. These materials include the RI, the SRI, the FS and other information used by EPA in the decision making process. EPA encourages the public to review the Administrative Record in order to gain a more comprehensive understanding of the Site and the Superfund activities that have taken place there. Copies of the Administrative Record are available at the following locations:

Hillsboro Public Library
214 School Street
Hillsboro, IL 62049
Phone: (217) 532-3055

EPA Region 5
Record Center, Rm 711
77 West Jackson Boulevard
Chicago, IL 60604
Monday – Friday 8 a.m. to 4 p.m.

Written comments, questions about the Proposed Plan or public meeting, and requests for information can be sent to either representative below:

Nefertiti DiCosmo (SR -6J)
Remedial Project Manager
Region 5 EPA
77 West Jackson Blvd
Chicago, IL 60406
dicosmo.nefertiti@epa.gov

Ginny Narsete (SI -5J)
Community Involvement Coordinator
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Following the conclusion of the public comment period on the Proposed Plan, a Responsiveness Summary will be prepared. The Responsiveness Summary will summarize and respond to comments on EPA's Preferred Alternative. EPA will then prepare a formal decision document, the Record of Decision (ROD), that summarizes the decision process and the alternative selected for the Eagle Zinc Site – OU 2. The ROD will include the Responsiveness Summary. Copies of the ROD will be available for public review in the information repositories, as describes above.